

IN THE CLAIMS

1. (currently amended) Measurement cell for an injection machine, the measurement cell comprising:

a cavity formed between two removable and exchangeable internal metallic blocks equipped with a cooling and heating system and laterally isolated from bodies that hold the blocks by a space of air that restricts transversal heat transfer in the cavity due to the presence of two and polymeric bars installed on its lateral edges to generate a one-dimensional heat transfer regime on the central zone of a plate of material to be analyzed[[],];

a set of fixed pressure and temperature sensors on the bodies connected for connection to a data acquisition system to store signals therefrom[[],]; and

a removable and reusable unit of at least three temperature sensors that possesses for connection to the data acquisition system, the temperature sensors being in ceramic or metallic tubes assembled in a supporting block carrier to guide and fix a group of at least three temperature sensors on the unit at the cavity also connected to the same data acquisition system, the tubes being supported by bodies that enable the reuse of the plate formed as such with the temperature sensors inside to measure the heating curves when the measurement cell is operated at high temperature with its heating system.

2. (currently amended) Measurement cell according to claim 1 characterized by possessing a cavity formed by two, wherein the removable and exchangeable internal metallic blocks manufactured in a metallic material with have a thermal conductivity higher than 100 times that of the material to be analyzed studied.

3. - 4. (canceled)

5. (currently amended) Measurement E_{cell} according to claim 1 characterized by possessing a cavity formed by two removable and exchangeable internal metallic blocks on its external lateral walls of the external blocks that contain them, for an air, wherein the space is at least 1mm thick.

6. (canceled)

7. (currently amended) Measurement E_{cell} according to claim 1, and further comprising characterized by possessing a cavity formed by two removable and exchangeable internal metallic blocks, fed by a chamber formed between the external metallic blocks that produces a flat flow front of the material to be studied during the filling of analyzed as being fed into the cavity.

8. (currently amended) Measurement E_{cell} according to claim 1 characterized by possessing a cavity formed by two removable and exchangeable internal metallic blocks, fed by a, wherein the chamber formed between the external metallic blocks with has a minimum depth of 2.5 times the a thickness of the cavity plate of the material to be studied.

9. (canceled)

10. (currently amended) Measurement E_{cell} according to claim 1, wherein a distance of 9 characterized because the removable unit of temperature sensors maintains said sensor stable in the exact pre-established position with a variation below 0.5% from its distance to the a face of the unit closest to the cavity, in the cavity's central zone, during the entire time that the measurement lasts sy varies less than 0.5%.

11. (currently amended) Measurement E_{cell} according to claim 9 1, characterized because the removable unit of temperature sensors is reusable for other measurements.

12. (currently amended) Measurement E_{cell} according to claim 9 1, characterized because the removable unit of temperature sensors allows to replace the temperature sensors in case these are damaged.

13.- 14. (canceled)

15. (currently amended) Measurement E_{cell} according to claim 9 characterized because 1, wherein the removable unit of temperature sensors possesses ceramic or metallic tubes with an internal diameter sufficient for the soft axial displacement of the temperature sensors during its installation or eventual change and with have an external diameter in the measurement a zone at the temperature sensors not above 2.4 times the diameter of the temperature sensors.

16. (currently amended) Measurement E_{cell} according to claim 9 1, characterized because the removable unit of temperature sensors possesses ceramic or metallic tubes assembled in a carrier block manufactured in a polymeric or ceramic material with enough mechanical resistance to support the pressure during the usage of the measurement E_{cell} .

17. (currently amended) Measurement E_{cell} according to claim 1, wherein 9 characterized because the removable unit of temperatures sensors possesses ceramic or metallic tubes supported on integrated or removable bodies made of ceramic, polymeric or wood material whose resistance to compression is above minimum 2 times the maximum compression effort generated during the closing of the measurement cell.

18. (currently amended) Measurement E_{cell} according to claim 9 characterized because the removable unit of temperature sensors possesses ceramic or metallic tubes that can be supported on integrated bodies made of ceramic or polymeric material whose height is higher than the cavity's height without exceeding it by 1% and whose thickness is not above 1.5mm.

19. (currently amended) Measurement E_{cell} according to claim 1, wherein lengths of the ~~9~~ characterized because the removable unit of temperature sensors possesses ceramic or metallic tubes that can be optionally supported by bodies manufactured in ceramic, polymeric ~~or wooden materials, installed at a distance from the end of the temperature sensors that inside~~ the cavity is not below 40 times its the diameter of the temperature sensors.

20. - 24. (canceled)

25. (new) A measurement cell for measuring thermal diffusivity of materials, such as thermoplastic polymers, during a non stationary heat transfer process, that can be installed, opened and firmly closed in an injection molding machine comprising:

a rectangular flat and narrow cavity in form of a plate to be filled with a said material whose thermal diffusivity is to be measured;

two removable and exchangeable metallic blocks that form the two rectangular big faces of said cavity, equipped with a cooling and a heating system that guarantee the one dimensional heat flow in said cavity separated laterally from mold's frames by the presence of an isolating film of air;

two polymeric bars forming two opposite narrow faces of said cavity that restrict the transversal heat flow in said cavity;

a removable unit of temperature sensors located at the third narrow face of said cavity, made of an isolating material that has ceramic or metallic small tubes embedded in a supporting block to guide and fix a group of temperature sensors extended into the central zone of said cavity connected to a data acquisition system to store their temperature signals; said tubes are fixed by small rips of said supporting block or by removable and reusable fixing elements that hold the temperature sensors in their exact position inside said cavity;

a chamber formed between the two mold's frames, coupled with the said cavity to its fourth narrow lateral face;

two pressure sensors, one located in said cavity and the second one in said chamber, connected to said data acquisition system to store their pressure signals; and

two temperature sensors lying on the two big rectangular and opposite faces of said cavity.

26. (new) The measurement cell of claim 25 in which the said two removable and exchangeable metallic blocks have drilled through holes parallel to the surfaces forming the two big flat faces of said cavity, where the holes closest to the said cavity faces are for the flow of a cooling liquid, and those far away from the cavity faces are for conventional high watt density cartridge heaters.
27. (new) The measurement cell of claim 25 in which one of the said two removable and exchangeable metallic blocks has a mini pressure sensor of a diameter no larger than 2.5 mm installed and located on the central zone of said cavity, where the material temperature is measured.
28. (new) The measurement cell of claim 25 in which the said two removable polymeric material bars are made of a polymer that does not melt at the maximum temperature of said heat transfer process.
29. (new) The measurement cell of claim 25 in which said removable unit of temperature sensors can be easily fixed and exactly installed on the third narrow face of said cavity.
30. (new) The measurement cell of claim 25 in which said removable and reusable unit of temperature sensors has temperature sensors exactly and stable positioned in pre-established distances from the closest face of said cavity and parallel to it with an accuracy below 0.5% of the said distance during the entire time of said heat transfer process

31. (new) The measurement cell of claim 25 in which said removable unit of temperature sensors allows the installation of minimum three temperature sensors.

32. (new) The measurement cell of claim 25 in which said removable unit of temperature sensors has small cylindrical or conical ceramic or metallic tubes to guide the said temperature sensors.

33. (new) The measurement cell of claim 25 in which the said supporting block of said removable unit of temperature sensors is manufactured in a polymeric or ceramic material with enough mechanical resistance to support the internal cavity pressure during the said measurement.

34. (new) The measurement cell of claim 25 in which said ceramic or metallic tubes are fixed by small rips of said supporting block or by removable and reusable fixing elements made of ceramic, polymeric or wood with a compression resistance of minimum 2 times the maximum compression stress generated when said measurement cell is closed.

35. (new) The measurement cell of claim 25 in which the height of said small rips or removable and reusable fixing elements is up to 1 % higher than the cavity's height and its thickness is not above than 1.5 mm.

36. (new) A method for determining the thermal diffusivity on a flat sample of a material using the measured temperature changes inside said material during a fast one dimensional cooling or heating process over a very extended temperature range, occurring between the two parallel faces of said sample, which can include phase changes of said material under high pressure, comprising the steps of:

obtaining at least three different temperature curves from recorded temperature changes in said sample, scanned at small enough time intervals or time steps in a data file, for at least three predetermined different measuring positions inside of said sample of said material equally spaced in the direction of the heat flow in said heat transfer process;

recording in said data file pressure values existing at same temperature measuring region of said sample for each time step during said heat transfer process;
recording in said data file the temperature of the two parallel faces of said sample during the said fast one dimensional heat transfer process in the said sample;

obtaining the temperature change rate over the time at each said measuring position as the numerical time derivative of corresponding said temperature curves;

obtaining the temperature laplacian over time at the middle position among said three temperature curves, as numerical second derivative of temperature with respect to the position coordinate;

calculating the thermal diffusivity values of said material as the ratio between said temperature change rate and said temperature laplacian for each said time step and for the average temperature during the said time step; and

finding in the said data file the pressure values at measuring region of said calculated values of thermal diffusivity.